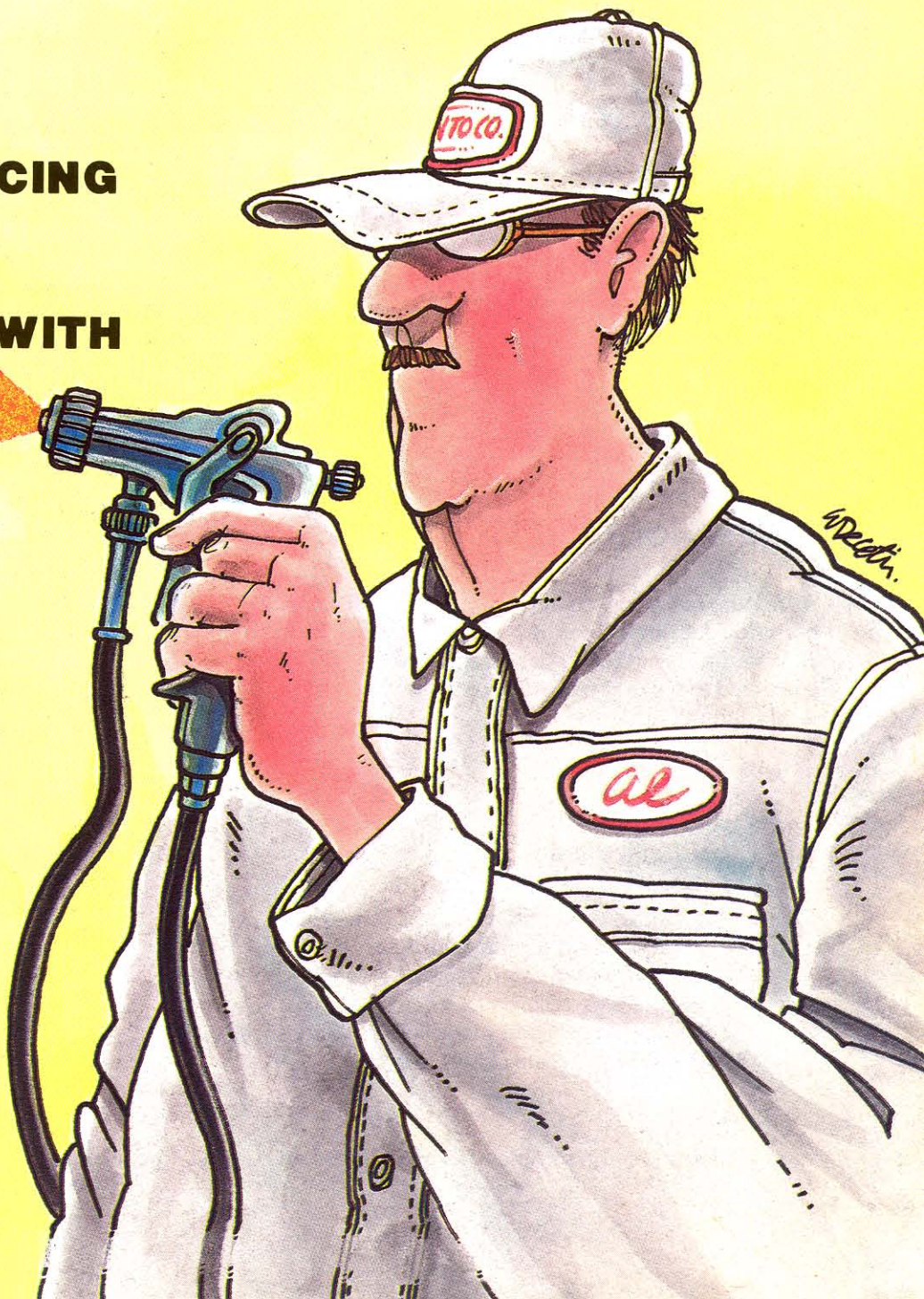
SELF-INSPECTION HANDBOOK

Surface Coating of Metal and Plastic Parts and Products

A GUIDE TO REDUCING AIR POLLUTION

HOW TO COMPLY WITH CALIFORNIA'S COATING REGULATIONS AND SAVE MONEY



AIR RESOURCES BOARD
COMPLIANCE DIVISION
COMPLIANCE ASSISTANCE PROGRAM

IN COOPERATION WITH
LOCAL AIR POLLUTION
CONTROL DISTRICTS

Compliance Assistance?

This handbook is designed to help you know the laws dealing with the coating of metal parts and products, plastic parts and products, large appliances and metal furniture, and other industrial surfaces. It illustrates how to comply with these laws by using self-inspections. Read on and see how you can improve your working conditions, keep your customers and neighbors satisfied, comply with the law, avoid penalties, and reduce air pollution. Self-inspections can even help you save money!

How Do I Comply & Avoid Penalties?

- Understand VOCs
- Know Your VOC Limits
- Use Complying Coatings
- Maintain Your Equipment
- Increase Transfer Efficiency
- Store Solvents Properly
- Be Aware of the Law

Inspections Aid Compliance

At regular intervals, an inspector from the local air pollution district will conduct a complete inspection of your facility. Your coating operations will be examined to see that you are in compliance with the local coating regulation.

The inspector will review:

- ✓ coatings used and products coated
- ✓ solvents used to thin coatings
- ✓ daily usage of coatings and solvents
- ✓ daily usage records
- ✓ product labels and manufacturer data sheets
- ✓ permit to operate conditions

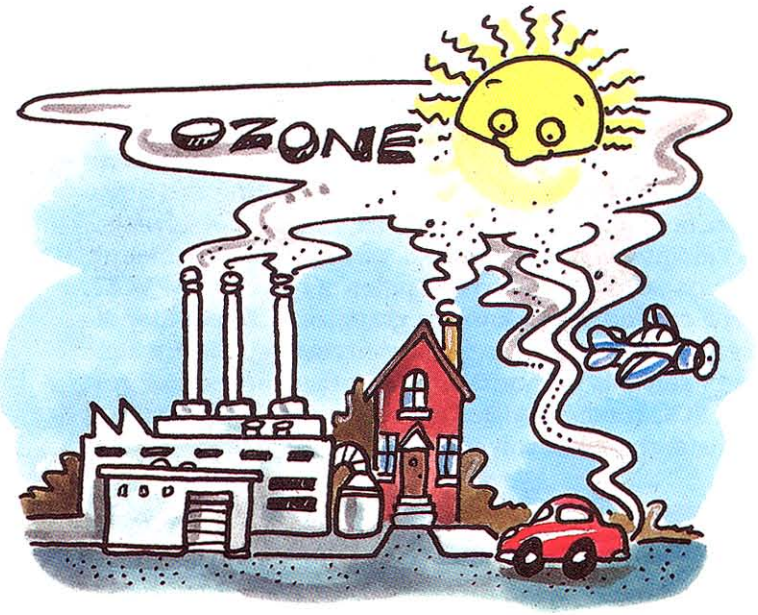
The inspector will examine:

- ✓ application equipment operation
- ✓ spray booth & filter condition
- ✓ surface preparation
- ✓ clean-up solvents and procedures
- ✓ coatings and solvents storage
- ✓ waste storage

Additionally, samples of the coatings being applied may be taken for laboratory analysis.

Why Reduce Air Pollution?

Air pollution affects millions of Californians every day. You can see it and you can feel it with every breath. Air pollution comes from many sources. In most areas, vehicles and industrial sources contribute equally to the pollution problem.



Smog & Ozone

The major air pollution problem in California is smog. Ozone is the major ingredient in photochemical smog. Ozone is a strong irritant that attacks the lungs, makes breathing difficult and may cause your eyes to water. Prolonged exposure can cause permanent lung damage. Ozone causes crop damage estimated to cost at least $330 million dollars per year in California. It has been directly linked to material damage, including paint damage, which is estimated at an additional cost of around $500 million dollars per year in the Los Angeles area alone.

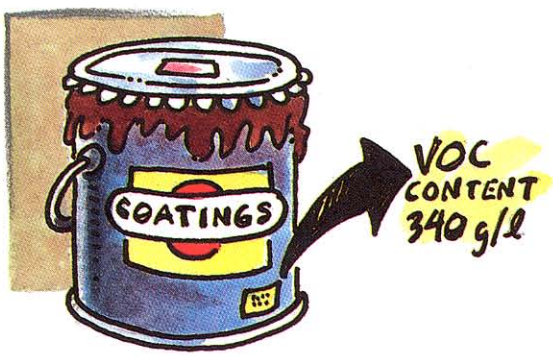
VOC Produces Ozone

Organic solvents, known as Volatile Organic Compounds (VOC), used in coatings and consumer products, cause greater VOC emissions than all the oil refineries in California combined. VOC are used in paints, strippers/cleaners, household products, etc. In the presence of sunlight, VOC participate in a complex reaction with oxides of nitrogen in the air to produce ozone.

The VOC from your coating operation mixes every day with other emissions in your area or air basin to produce ozone. On days when ozone becomes trapped within your air basin, the concentration builds up, irritating residents and workers alike. By reducing the amount of VOC in coatings, in combination with other efforts to reduce the VOC emissions from all other sources and products, you can help reduce ozone and maintain a healthy environment. Reducing the amount of VOC in coatings can reduce the exposure of your workers to organic solvents and diminish your waste disposal costs.

Where is the VOC in Coatings?

Coatings consist of solids (resins, pigments, extenders, additives) and solvents (including diluents) . Solvents and diluents lower the viscosity (reduce or thin), and act as the carrier for the solids. Solvents also are used to dissolve the solid resin. Solvents evaporate from the coating before, during and after application. Solvents include VOC, water, and exempt solvents. To protect air quality, regulations exist which limit the amount of VOC which can be contained in a gallon of coating. The VOC content of a coating is measured in grams of VOC per liter of coating or in pounds of VOC per gallon of coating. Since water and exempt solvents do not take part in the reaction to form ozone, the VOC content is listed as "grams per liter of coating minus water and exempt solvent."



Know the VOC Content

The VOC content of coatings is usually printed on the exterior of the can by the manufacturer. This convenient reference enables you to operate in compliance with the regulations. For those companies who do not print the VOC content on the label, ask for a **VOC Data Sheet** or a **product specification sheet.** VOC Data Sheets list coating information in an air quality approved format while product specification sheets list the VOC content as well as mixing ratios and other pertinent information. Material Safety Data Sheets (MSDS) often do not contain the required air pollution information.

Calculate the VOC Content of Your Coatings

VOC content is the weight of VOC per volume of coating. If one liter of a coating which does not contain water or exempt solvents has 250 grams of VOC, the VOC content is 250 grams VOC per liter. One pound per gallon equals 119.8 grams per liter. If you only have the MSDS, you often can still calculate the VOC content:

The MSDS listed percentages of VOC by weight for this coating can be multiplied by the weight per gallon (density) of the coating. As an example, if the coating weighs 10.4 lbs/gal with 2% by weight xylene, 2% toluene, 6% MEK, 10% mixed aliphatics, and 80% solids the VOC content would be 250 grams per liter.

Xylene	**---**	**2% lb/lb x 10.4 lb/gal**	**=**	**0.21 lb/gal**
Toluene	**---**	**2% lb/lb x 10.4 lb/gal**	**=**	**0.21 lb/gal**
MEK	**---**	**6% lb/lb x 10.4 lb/gal**	**=**	**0.63 lb/gal**
Mixed Aliphatics	**---**	**10% lb/lb x 10.4 lb/gal**	**=**	**1.04 lb/gal**
		20% lb/lb x 10.4 lb/gal	**=**	**2.09 lb/gal**

or converting to grams per liter

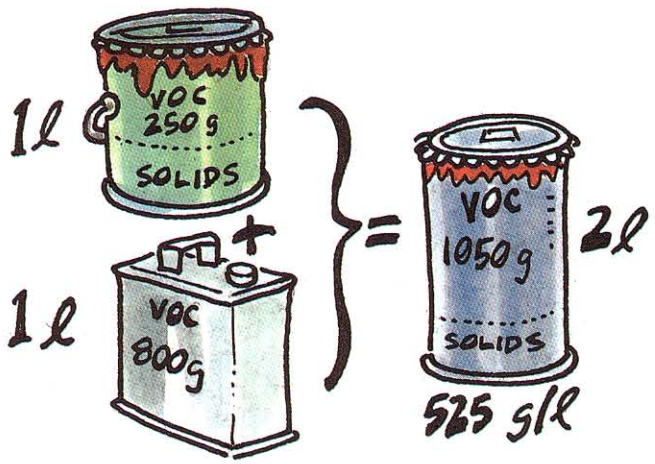
2.09 lb/gal x 119.8 (g/L)(gal/lb) = 250 g/L

Read on:

This simplified calculation may not be appropriate for coatings which contain water or exempt solvents or for multi-component coatings. Also, MSDS may list a range of weights for each VOC. Your local regulations may specify the calculation methods you will need to use. Local air pollution districts and coating manufacturers can provide assistance in performing these calculations. To verify the VOC content of a coating, laboratory test methods are used.

Thinning May Increase VOC

Remember, when you thin or reduce your coating with VOC , the new VOC content of your coating may be higher than is listed on the container or specification sheet. You may create a coating which no longer complies with local coating regulations. If you use water or an exempt solvent without co-solvents for thinning, you do not affect the VOC content of the coating.

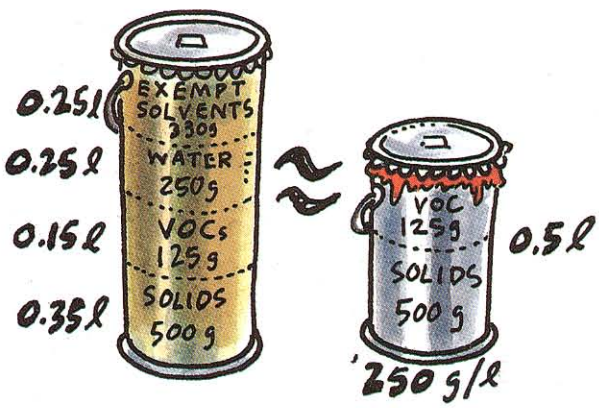


If you thin with VOC , the VOC content will increase. For example, if you add one liter of thinner at 800 grams VOC per liter to one liter of coating with 250 grams VOC per liter, the final VOC content becomes 525 grams VOC per liter.

$$\frac{800\ g + 250\ g}{1.0\ L + 1.0\ L} = 525\ g/L$$

Adding Water Will Not Reduce Your VOC

Most rules will allow coatings to have as much water and exempt solvent as you want. However the weight and the volume of the water and exempt solvent is not included when calculating the VOC content of the coating. Be aware that some exempt solvents, such as 1,1,1 trichloroethane (TCA), contain stabilizers or co-solvents. These stabilizers are usually VOC and must be included in the calculation. For example, if one liter of coating contains 0.35 liter of solids, 0.15 liters VOC, 0.25 liters of water, 0.25 liters of exempt solvent which weigh 500 g, 125 g, 250 g, and 330 g, respectively, the VOC content is 250 grams per liter of coating minus water and exempt solvent..



$$\frac{125\ g}{0.35\ L + 0.15\ L} = 250\ g/L$$

Caution:

Some exempt solvents may be incompatible with certain surfaces and coating equipment, or may be regulated as toxic compounds in the future.

Know Your VOC Limits

The provisions of your specific coating rule will outline the exact limits for your coating. As an example, most air dried coatings applied to metal parts and products must have a VOC content lower than 340 g/L. Many coatings have different speciality VOC limits depending upon their intended use. For example, extreme high gloss coatings have a higher VOC limit than primers because additional solvent is currently necessary to achieve a greater reflective sheen. Get a copy of your local rule and know what limits apply to your operation. Your local air pollution or air quality district can supply you with more information.

Whenever higher speciality coating limits are allowed, the actual end use of the product must justify the speciality coating. The rule will usually specify a test method which allows you to differentiate between a standard and speciality coating. If a sample is taken of the coating, the coating must pass the test in order to qualify for the higher VOC limits.

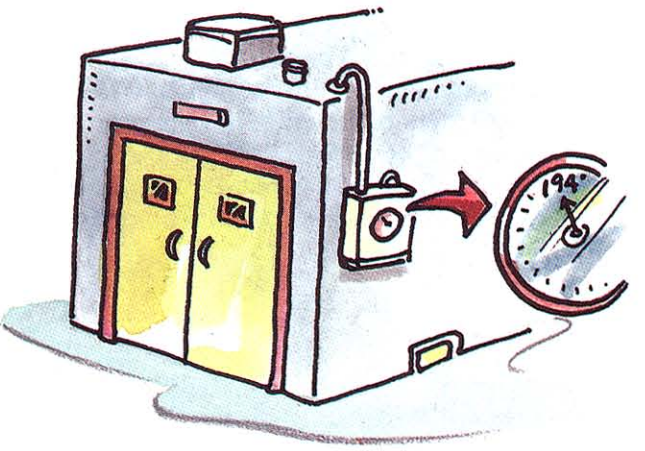
Speciality coating limits are not automatic. In many districts, you must submit an application to the district to qualify for the higher VOC limits. Cover yourself. Make sure you have the written approval by the district before you apply the coating.

Be aware that coatings made for the higher speciality limits and for areas which do not have metal and plastic parts rules can be sold anywhere in California. Just because you spend money on a coating or someone specifies a coating does not mean you can apply that coating. It is your use of a non-complying coating or invalid speciality coating which is in violation.

Limited exemptions for some operations and alternate emission control plans are available under certain rules. However, you may have to get written approval from your local district to qualify for the exemption.

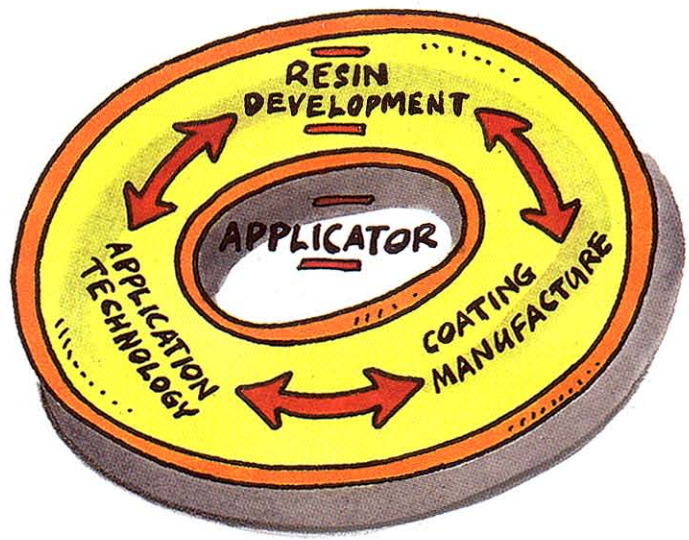
Lower Limits For Baked Coatings

Most rules have lower VOC limits for baked coatings. Baked coatings are usually those which are oven dried at a temperature which exceeds 194 degrees fahrenheit. The VOC content for baked coatings applied to metal parts and products is usually limited to 275 g/L. The content is lower because VOC exposed to high temperatures may become highly reactive and form ozone quicker. Ensure that your temperature controls are accurately maintained. The wrong temperature may ruin your part and the coating.



Choose and Use Complying Coatings

Many complying coatings are available to meet the specific requirements of local district regulations. Coating technology continues to develop and new resins are being incorporated into innovative coating systems to meet industry's changing needs. Application equipment is being designed and improved to apply the new coatings at greater efficiencies. It is important that you maintain contact with many manufacturers of coatings and application equipment to make sure you have a system that works best for your operation. Cost savings for you include improved coating quality, lower quanities of coatings purchased and applied, and reduced waste disposal costs. Air quality benefits from reduced VOC emissions.



What Coating Systems Are Out There?

Water Borne - Water is the major solvent and includes water reducible and emulsions. These coatings usually **include VOC** as co-solvents.

High Solids - Coatings that contain greater than normal resin and pigment content (70 - 80% by volume).

Powder - Dry finely ground coating which is heated to its melting point so that the powder can flow together.

UV Curable Coating - Liquid resin and pigment which uses UV light to cure the coating.

Exempt Solvent based - Coatings that contain exempt solvents, primarily 1,1,1 TCA. These coatings usually **include VOC** as stabilizers and co-solvents.

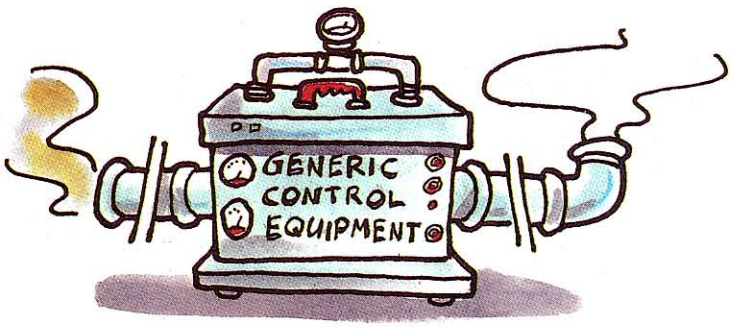
Catalyzed Coatings - Two or three component coatings which are mixed together prior to application.

Electrodeposition - Dip coating process where water borne coatings are electrically "plated-out".

Autodeposition - Dipcoat plating process without electrical charge.

Other coating systems may be available and all systems have advantages and disadvantages. Be sure to consider worker safety, respiratory protection, waste disposal, surface and equipment compatibility, fire requirements, odor releases, and emissions of potentially toxic materials while deciding on a coating system. Remember, keep the solids content in mind when comparing the costs of your coatings. Contact your suppliers for additional information.

Control Technology Can Work For You



Some operations consume large volumes of coatings and solvents. Add-on control equipment can, in some cases, lower operating costs and help you comply with air quality regulations. The major types of add-on control equipment are:

Incinerators destroy solvents by burning to form carbon dioxide and water. However other gaseous pollutants may be created. Catalytic and thermal incinerators are often coupled with heat recovery units that help lower operating costs for baking ovens.

Carbon adsorption and **spray absorption** systems capture and recover solvents from the air after it passes through the spray booth and ovens. In some cases recovered solvents can be reused or recycled.

Carbon filter concentration systems combine carbon adsorption to concentrate the VOC with incineration to destroy the VOC.

Although these systems can be costly, when compared to the increased costs per gallon for compliant specialty coatings, they may pay for themselves. Contact your local district and control equipment vendor for more information.

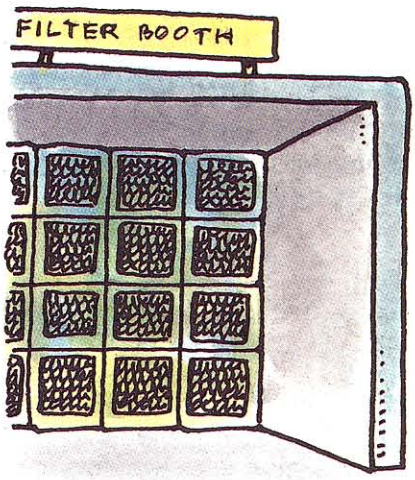
But My Coatings are **Non-Photochemically Reactive!**

When coatings are exempt from the requirements of specific surface coating regulations, such as a metal & plastic parts and products rule, the coatings must comply with the requirements of general solvent provisions in another district rule. General solvent provisions allow limited amounts of highly reactive solvents to be in the coating. These highly reactive solvents, which include xylene and toluene, are called photochemically reactive because they contribute to the extremely rapid formation of ozone in the presence of sunlight.

For the most part, coatings which are labeled "non-photochemically reactive" will comply with the general solvent provisions; however, they still contain VOC. You should consult your rule and examine the manufacturer's coating specification sheets to be certain. Do not hesitate to contact the coating manufacturer if you need additional information. For a copy of the general solvent provisions for your area, contact your local air pollution control district.

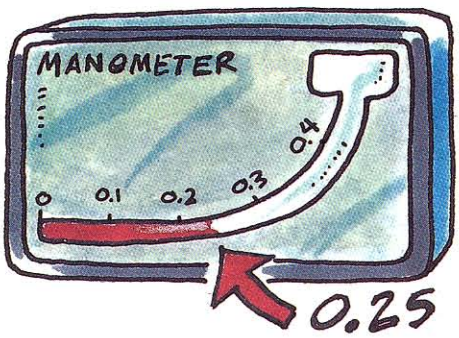
Maintain Your Spray Booth Filters

Spray booth filters prevent paint overspray from traveling up the exhaust vent. Filters help increase the lifespan of the exhaust fans, reduce fire hazard, and provide protection from the deposit of paint particles outside the building. It is important to maintain your booth to ensure that your operation does not cause a public nuisance. Paint overspray can travel through ineffective filters and damage the finish of automobiles and structures near your operation. Always make sure that the filters are installed properly and cover all openings.



Filters Do **NOT** Control VOC

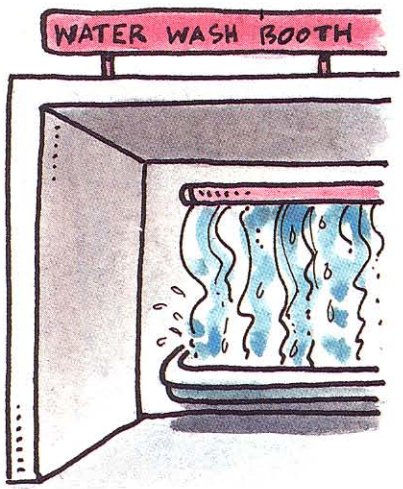
Check Your Pressure



A manometer is used to determine the pressure drop across the spray booth filters. As the filter pores become clogged, the pressure drop increases. To be effective, most filters should be replaced when the pressure drop exceeds 0.25 inches of water. Check your manometer frequently for accuracy and maintain its fluid level. The pressure drop should read zero when the exhaust fan is off.

Keep Your Curtain Wet

Waterwash booths should provide a continuous sheet of water down the face of the rear booth panel. The water sheeting collects the overspray from the painting operation and the particulates can be skimmed from the surface of the water for disposal. If the booth does not provide a continuous sheet of water, i.e. if dry spots appear, the water spray lines should be checked for clogged openings. Remove the booth from service and repair the water lines immediately. Be sure to check and maintain the chemicals and additives in the water. Be aware that local health services and water quality control agencies may have additional requirements.



Increase Your Transfer Efficiency

BUY LESS PAINT

Transfer efficiency is the percentage of paint solids deposited on the surface of your product. If you achieve 30% transfer efficiency, then 30% of the paint solids sprayed have adhered to the product, and 70% of the paint solids are on your floor, booth walls, and exhaust filters. If you can get more paint to stay on the product, you can buy less paint.

Why Can't I Use My Old Spray Gun?

Older spray equipment does not give you high transfer efficiency. Conventional air spray, airless, and even the newer air-assisted airless spray equipment, in many cases, will not meet the high transfer efficiency requirements and will waste paint.

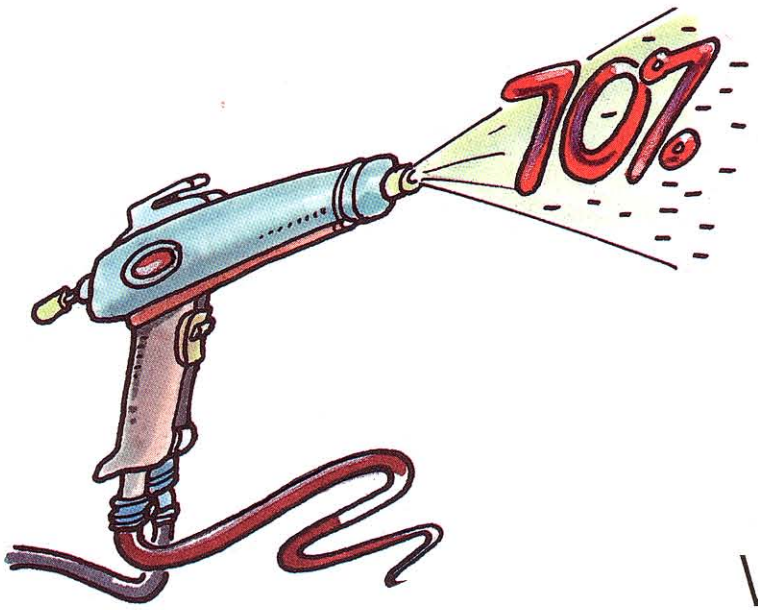
Conventional air atomization uses a high velocity air stream to break the coating into little droplets. The application can be controlled by air pressure, paint viscosity, and the gun tip. However, the high air velocity causes paint droplets to dry before reaching the part and increases paint bounce-back and overspray. These combine to reduce transfer efficiency and you use more paint.

Airless spray uses high pressure paint through the gun tip to produce droplets. Greater volumes of paint can be applied with reduced bounce-back, but this method may not produce a high quality finish.

Air-Assisted airless spray combines air and airless features. Pressurized paint is atomized with air at the cap to produce droplets. This method has shown better transfer efficiency over air atomization and better finish quality when compared with airless spray.

Wasting Paint Is a Waste of Money

Low transfer efficiency wastes paint for which you have paid good money. Low transfer efficiency increases your booth filter purchases, increases your booth cleaning expenses, and increases your waste disposal costs. Train your painters to maximize their efficiency. Consider racking parts to make overspray land on a part. Make sure automatic spray lines spray the parts and not empty hooks.



High Transfer Efficiency is Required

Most districts require the use of high transfer efficiency application methods. Electrostatic spray, High Volume Low Pressure (HVLP) spray, flowcoat, dipcoat, rollercoat, and brushcoat will usually comply with district transfer efficiency requirements. Call your local APCD for more information.

What Methods Can I Use?

Electrostatic Spraying - Paint droplets are given an electrical surface charge which attracts them to the grounded product. Greater transfer efficiency can be achieved due to the attraction and to the "wrap-around" effect where paint lands on the backside of the object.

High-Volume Low Pressure - High volumes of low pressure air atomizes paint through larger air holes. Low pressure reduces turbulence and bounce-back.

Rollercoating - Coating is applied by a mechanical series of rollers from a paint trough to a flat surface.

Dipcoating - Parts are immersed into a tank of coating followed by drainage of excess coating back into the tank.

Flowcoating - Paint flows over conveyorized products. Excess coating is collected and recirculated.

Brushcoating - Coating is manually applied using brush or rollers.

Transfer Efficiency Depends on **YOU**

Transfer efficiency is dependent upon many factors which include proper operation and maintenance of the coating equipment, size and shape of the part, type of coating, ambient temperature, humidity, and operator training and error. You can take these steps to increase your efficiency:

- Minimize airflow through booth
- Eliminate cross drafts
- Reduce air pressure in gun
- Allow dipped parts to drain
- Only spray the part
- Turn on power to electrostatics
- Keep a good clean ground
- Hook up the grounding strap

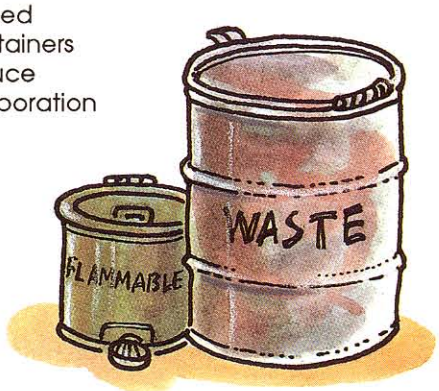
Contact your equipment supplier for more information on how to improve your transfer efficiency. Even if you are not required to increase your transfer efficiency, you should check into it. **It can save you money.**

Store Your Solvents and Coatings Properly

Seal all containers of coatings and solvents tightly. Cans and drums should be equipped with tight fitting lids and should remain closed to prevent evaporation between uses. Large drums should have screw caps to cover the bung holes and should be opened only to empty or fill the drum. Use a funnel when filling and make sure to close the drum completely when you are finished.

Watch for the expiration date. Dispose of your expired coatings properly.

Closed containers reduce evaporation



Seal All Waste Containers

Store waste solvents in tightly sealed containers. Make sure the bung holes in 55 gallon waste solvent drums are closed. All solvent laden rags and cloths including those used to clean parts and spray equipment should be stored in closed **fireproof** containers. Store and dispose of materials in accordance with local fire department and health services agency requirements.

Clean It Right!

VOC from your facility can be reduced significantly by cleaning your spray guns and other equipment properly. **Never** clean your lines by spraying VOC into the air or into the filters. Purging your lines in this manner wastes your cleanup solvent and is a violation of local air quality regulations. Always direct the clean-up solvents, using minimal pressure, into containers to prevent evaporation. Soak spray guns in closed containers and avoid the use of VOC for clean-up whenever possible.

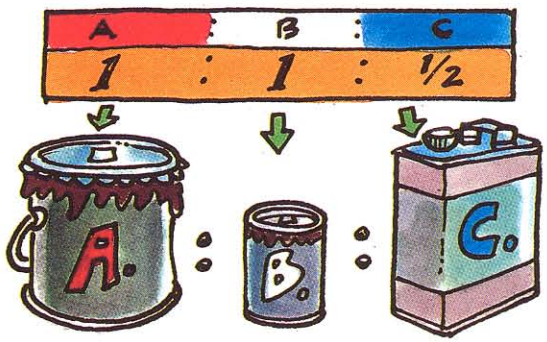
New Requirements in Surface Preparation

New requirements are being implemented to require the use of low VOC content surface preparation solvents. Solvent degreasers are subject to additional requirements under local district regulations. You should investigate if abrasives, water with surfactants, exempt solvents, alkaline washes, or acid etches can be used for surface preparation in your operation. Many coating operations have found that switching from solvent cleaners to other surface preparation methods can save money and reduce disposal costs.

Always Follow Mixing Directions

Coating manufacturers will supply you with instructions when the coating contains more than one component. Often the coatings must be mixed with a thinner and a catalyst. Always mix according to the instructions. Otherwise the coating may not adhere correctly, produce the desired finish, meet performance specifications, or comply with air regulations.

Post your mixing ratio for commonly used coatings



Use a measuring cup to be sure that you are mixing known volumes

Keep Logs Current

Rules require that you keep detailed records of the coatings applied at your facility. Records should include: coating identification, components used including reducer and catalyst, mix ratio, volume applied, VOC content as applied, substrate coated, and application method.

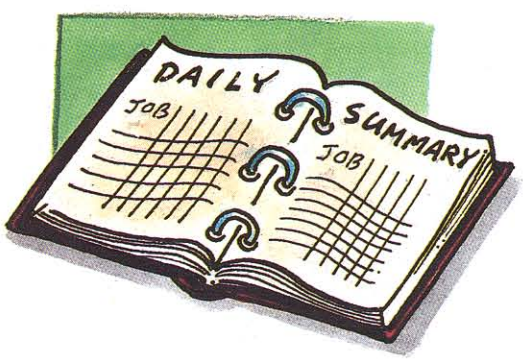
Records should be filled out at each application area. Your records should then be summarized daily and should accurately demonstrate that you operate every application area in compliance each and every day. Regulatory agencies do not look favorably upon inaccurate records.

One proven method of recordkeeping involves the use of 'job tickets' and a summary log. Many facilities instruct the operator to record coating information for each job on a production ticket at the booth. The 'job tickets ' are then summarized nightly by the supervisor. Many district rules require that the coating records be retained by the operator for two years. Job tickets and coating logs should be stored for this purpose.

Contact your local district for recordkeeping requirements and to obtain a standard form if one is available.

Know What Your Records Say

Nobody wants inspectors visiting everyday. Accurate recordkeeping helps to ensure that you operate in compliance daily. Daily recordkeeping has several advantages for you. Your records tell you how much paint you use each day. You will have an accurate record of production expenses which can enable you to cut costs. Also, if you only have monthly purchase records and a violation is discovered, the district will assume you were in violation every day you operated during the month. Penalties are based upon the number of days in violation. It is to your benefit to easily show that you made a mistake on only one day.



Remember, your permit to operate may include a limitation on daily coating usage. Do not paint more than your permit allows or you will violate local regulations. Modify your production schedule to avoid penalities. Be careful with multiple shifts. If you cannot modify your daily production, contact the district.

Caution: Read Between the Lines

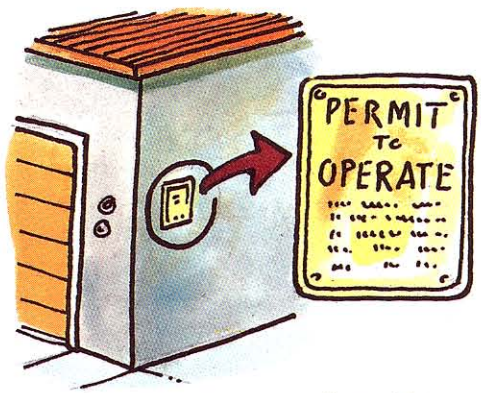
Never accept a contract which requires that you use coatings which do not comply with the local VOC requirements. **You** can be held liable for each and every day that you apply non-complying coatings.

When you see that a contract requires you to use an illegal coating, ask the company to change the terms of the contract. Also, let them know that under most regulations, they too will be held responsible for the violation of the law no matter what coating shop they use to complete the contract. This is known as prohibition of specification, which states that no person shall apply a non-complying coating nor **specify** the use of a non-complying coating. Military specification coatings are also subject to this requirement. Local districts adopted this concept at the request of job shops who were afraid of losing business to competitors who were ignoring the law.

Display Your Permits

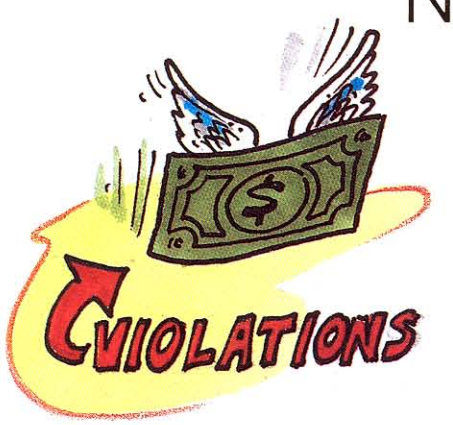
Place your permits in a visible place whenever possible. Permits contain conditions which must be met by the operator and should be readily available. Make sure that you follow the conditions outlined on your permit. It is important that the operators understand all of the permit requirements especially usage limitations. If this entails translating into another language, you are encouraged to do so.

Permits are usually renewed annually. Make sure the renewed permits accurately reflect your equipment and operation. If it is not accurate, inform your district in writing. Always post the most recent version of your permits. Many operators provide plastic covers for the permits to protect the permits from damage.



Try not to paint your permit

No Surprises - Violations Cost You **Money**

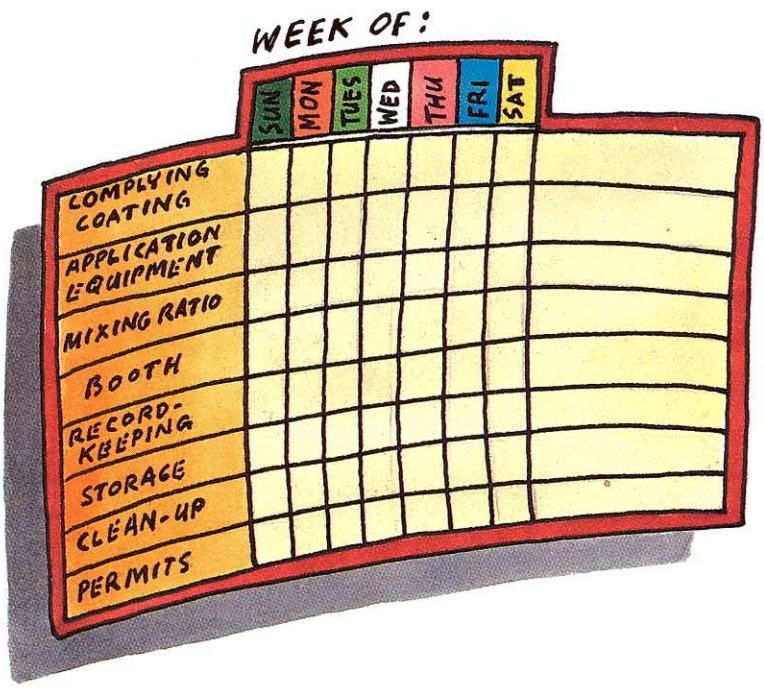


Air pollution regulations are law. Violations of air quality regulations can cost you money. Penalties can run as high as $25,000 per day for each violation. In some cases, violations can lead to a loss of permits to operate, resulting in a loss of business. Additionally, you can be sent to jail. From another perspective, many of the regulations are designed to reduce the amount of coating you need to apply to a surface to achieve the same product. Violations can also mean extra production costs to you.

Be aware of all local requirements. Don't have any surprises when the inspector comes to visit.

Self-Inspection Checklist

A self-inspection checklist is a good way to protect yourself from large penalties and loss of business. An example of a checklist is provided here, but you should come up with a specific checklist for your operation. The checklist used with your metal & plastic parts and products handbook, your air pollution control permit, and the district regulation will help you prepare for your periodic air pollution control inspection. The information contained in the handbook and checklist covers the basic requirements you need to know. For further information, ask your inspector any specific questions you may have about your operation. Make sure everyone mixing and applying your coatings, or cleaning up after your coating operation understands and follows all of the requirements. Experience tells us that the best way to comply with air pollution regulations is to know the law, keep up with technology, and to inspect your operation daily.



Need More Information?

Air Resources Board (800) 952-5588 **District: _____**

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4 - Monterey Bay (831) 647-9411
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6 - Northern Sierra (530) 274-9360
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